shown by the experimental results obtained, the experiments being conducted in many instances in barns which can only be described as filthy.

First, with regard to the small-top pail; this is a pail with a lid covering, say, two-thirds of the top of the pail. Using *unsterilised* pails without any other precaution, the open pail gave an average per cubic centimetre of 497,653 bacteria, while the small-top pail gave an average of 368,214 bacteria—a 25 per cent. reduction. With *sterilised* pails, under the same conditions, the numbers were 22,677 and 17,027 respectively, an enormous reduction by the additional precaution of using sterilised utensils. Washing of the udder and teats reduced the bacterial content of the milk by about 50 per cent. By a combination of these three factors it was possible to produce a milk containing only 2000–3000 bacteria per cubic centimetre even on farms which by any ordinary standard would be considered to be very unhygienic. The original cost of a small-top pail is little more than that of an ordinary open pail, and it is no more expensive or difficult to care for. Prof. Delépine, in a report (1918) to the Sub-Committee on Clean Milk of the Sanitary Committee of the Manchester City Council, arrives at much the same conclusions. He summarises the points requiring special attention as follows: (1) Cleanliness of the shippens, cows, milkers, utensils, and dairy-hands; (2) protection of milk against dirt during milking; (3) sterilisation of milk pails, churns, etc., and their protection against re-infection pending using; (4) protection of fresh milk against admixture with stale milk; (5) avoidance of straining through a common strainer; (6) avoidance of cooling by methods causing large surfaces of milk to be exposed to the air or to unsterilised surfaces; and (7) cooling of the milk by keeping churns in cold stores or places.

Prof. Delépine advocates the use of the small-top pail or some similar device. He finds that pails, coolers, and churns cleaned with very pure cold and hot water, and apparently scrupulously clean, are still capable of imparting a large number of bacteria to the milk, and urges the importance of steam sterilisation of the utensils. This last condition is not so difficult to accomplish, even on the small farm, as might at first sight appear, for simple and inexpensive steam generators can be devised. With a small boiler holding six quarts of water, heated with a paraffin stove and boiling in six minutes, it is possible to sterilise at one time six two-gallon pails or cans in fifteen to twenty minutes. By ensuring clean cows and milkers, and the use of sterilised utensils and of the small-top pail or similar device, really clean milk with a very low bacterial content, and therefore with enhanced keeping qualities, can be produced without of necessity the expensive remodelling of cowsheds and premises, and with very little disturbance of the time-honoured routine of the ordinary farmer or dairyman on the average farm.

R. T. HEWLETT.

## NOTES.

SIR NAPIER SHAW has been elected a foreign member of the Reale Accademia dei Lincei of Rome.

WE notice with much regret the announcement in the *Times* that Prof. E. C. Pickering, director of the Astronomical Observatory of Harvard College, died on February 3 at seventy-two years of age.

A SPECIAL general meeting of the Geological Society will be held on Wednesday, March 26, to consider the resolution of the council of the society:—"That it is desirable to admit women as fellows of the society."

THE Institution of Civil Engineers has elected upon its roll of distinguished honorary members Marshal Foch, O.M., Field-Marshal Sir Douglas Haig, K.T., and Admiral Viscount Jellicoe of Scapa, G.C.B., O.M.

THE gold medal of the Royal Astronomical Society has been awarded by the council to M. Guillaume Bigourdan for his observations of nebulæ, carried on for about twenty-five years. It will be presented at the annual general meeting of the society on Friday, February 14.

AT the general monthly meeting of the members of the Royal Institution, held on February 3, a bequest of 300*l*. was reported from the late Dr. T. Lambert Mears, who was a member of the institution for fifty-three years, and a donation of 50*l*. from "an old member" in celebration of his fiftieth year of membership.

WE learn that M. G. Grandidier has been appointed general secretary of the Société de Géographie of Paris in succession to the late Baron Hulot. Baron Hulot, who had been secretary of the society for more than twenty years, was an occasional contributor to the pages of *La Géographie*. One of his most important papers was a life of d'Entrecasteaux, which appeared in 1894, and was the first complete biography of the explorer. M. Grandidier is well known for his researches in the exploration and geography of Madagascar.

THE Royal Horticultural Society in its report for 1918, which has just been issued, makes the important announcement that the revision of "Pritzel" is now in hand, and that the work of preparing it for the press is in progress at Kew under the personal supervision of Capt. A. W. Hill. It is estimated that the work will include about 250,000 references, and its cost of production will be at least 3500*l*., towards which assistance is asked from the botanic stations, experimental stations, and libraries of the world as well as from private subscribers. All subscribers of 15 guineas will receive a free copy, and those of larger amounts a specially bound copy, according to their donation.

IT was announced by the president of the Royal College of Physicians on January 30 that the Swiney Prize, the award of which is adjudicated by a joint committee of the College and of the Royal Society of Arts, has been awarded to Dr. C. A. Mercier for his work on "Crime and Criminals." Dr. Raymond Crawfurd has been appointed to deliver the Harveian Oration of the College on St. Luke's Day, October 18, Dr. A. P. Beddard to be Bradshaw Lecturer, and Dr. Aldo Castellani to be Milroy Lecturer for 1920. Dr. J. McVail will deliver the Milroy lectures on "Smallpox and Vaccination since 1870," on March 13, 18, and 20; Dr. Topley the Goulstonian lectures on the "Spread of Bacterial Infection," on March 25 and 27 and April 1; and Sir H. D. Rolleston the Lumleian lectures on April 3, 8, and 10, taking as his subject "Cerebro-spinal Fever."

AT the annual general meeting of the Royal Anthropological Institute, held on January 28, the following were elected as officers and council for 1919–20 (the names of new members are in italics):—*President: Sir Everard im Thurn. Vice-Presidents:* M. Longworth Dames, *S. H. Ray,* and Dr. W. H. R. Rivers. *Hon. Secretary:* Dr. H. S. Harrison. *Hon. Treasurer:* R. W. Williamson. *Council:* Capt. F. R. Barton, L. C. G. Clarke, *Miss M. E. Durham,* Dr. W. L. H. Duckworth, Sir J. G. Frazer, *Capt. A. W. F. Fuller,* Dr. R. J. Gladstone, Dr. W. L. Hildburgh, *Capt. T. A. Joyce, H. G. A. Leveson,* A. L. Lewis, Miss M. A. Murray, *E. A. Parkyn, Prof. F. G. Parsons, W. P. Pycraft, Capt. C. G. Seligman,* Dr. F. C. Shrubsall, *Lt.-Col. L. A. Waddell,* S. Hazzledine Warren, and *Prof. W. Wright.*

PROF. ICILIO GUARESCHI, who died recently after a very short illness, was professor of pharmaceutical chemistry and toxicology in the University of Turin and director of the Institute of Pharmaceutical Chemistry. He was one of the leading Italian chemists, devoting himself chiefly to researches on the alkaloids. The most important of his published investigations in this field were his chemical, physiological, and medico-legal researches on the ptomaines, but he also worked upon the derivatives of quinoline, on cocaine, on creatinine, etc. These investigations led ultimately to the publication by Prof. Guareschi of a volume summarising our knowledge of the alkaloids. This work was translated from the Italian into several other languages, and gained for the author a world-wide reputation. During the war he carried out investigations on the toxic gases used in chemical warfare, and much of his leisure was devoted to the study of the history of eminent chemists and physicists.

PARIS last week was greatly delighted with M. Guitry's five-act play *Pasteur.* M. Guitry *père* acted Pasteur, M. Guitry *fils* wrote the play; we are thus reminded of that filial affection which was one of the many inspirations of Pasteur's life. The play begins with the dispersal of Pasteur's students from the Ecole Normale at the call of the war of 1870–71; it ends with the celebration of his seventieth birthday, when the representatives of every country of the civilised world came to Paris to honour him and thank him. Lovers of the "Vie de Pasteur" and of Godlee's "Lister" do not need to be told about Pasteur. To those who saw Pasteur, sat at table with him, heard the slow, grave, quiet voice, watched the keen eyes and the tired, sad look of the face, it will be strange to think of him put on the stage. Besides, the life of a man of science is not a good theme for a five-act play. Galileo might stand through an act or two, or Vesalius—for the Holy Inquisition would make a "good curtain"—but Euclid, Aristotle, Newton, Galvani, Faraday, Darwin, are not figures for a theatre. What has Science to do with Drama? But Pasteur stands not for science alone; he stands for France. His father had served in the Grand Army; had received the Legion of Honour; had taught his children to believe in France, in her God, and in her glory. Pasteur was possessed, heart and soul, by the love of home and the love of France. The war of 1870–71 half-killed him. What could he do to help and console and glorify France in his life? "Henceforth," he said, "every one of my books shall have it written across them, *Revenge, Revenge.*" That was his share of *la revanche*: to raise France out of the horror of defeat, exalt her over Germany, set her on her throne, by the work of his thought. That is what he did, what he lived for. "Science," he said, "has no country of her own; but the man of science ought to have a country of his own." Pasteur represents everlastingly the spirit of France, the genius of France. So it is a good thing, in this wonderful year, that some likeness of him should live and move before the scenes of a Paris theatre; that some of his words should be spoken by a living voice in the city where his body was buried. It would not be surprising if the Germans, a few years hence, should want to translate the play and produce it in Berlin as an educational instrument to teach the importance of bacteriology for the advancement of material prosperity.

SIR ARTHUR NEWSHOLME has retired from the post of Principal Medical Officer to the Local Government Board a year or two before the time when his period of office would actually have expired under the Civil Service age limit—probably in anticipation of changes in the Department incidental to its incorporation in the proposed Ministry of Health. During his tenure of office Sir A. Newsholme has been responsible for special developments of public health work in various directions to which comparatively little attention had been directed in official quarters. Among these may, perhaps, be regarded as most important the introduction of the notification and treatment of tuberculosis, a general scheme for the treatment of venereal disease, and one for the advancement of maternity and child welfare work, in this latter respect continuing and expanding the pioneer work of his predecessor, Sir William Power. As addenda to his annual reports on the work of the medical department, Sir A. Newsholme published a series of reports dealing with the question of infant mortality and the various factors found, as the result of special inquiries by members of the inspectorial staff, to have a bearing on it, especially in a number of manufacturing areas, where, although, so far as was previously known, the conditions were somewhat similar, nevertheless the infantile death-rate varied within wide limits. Mention should also be made of the "General Review of Progress since 1871," published as an introduction to the report of the Medical Officer for the year 1917–18, in which the saving of life which has occurred in the forty years since the appointment of Mr. (afterwards Sir) John Simon as the first Medical Officer of the Local Government Board is illustrated by a comparison of the death-rate at different ages in 1911–15 and 1871–80 respectively. During the whole period of the war Sir A. Newsholme has acted on the Army Sanitary Committee, holding the rank of Lieut.-Colonel, R.A.M.C. (T.), and it has been largely due to his efforts that military and civilian public health authorities have worked together so harmoniously on the various special problems which developed as the outcome of war conditions. In acknowledgment of his services to the State, Sir Arthur Newsholme was created a C.B. in 1912 and a K.C.B. in 1917.

THE death is announced, in his fifty-first year, of Prof. Wallace Clement Sabine, who had been professor of mathematics and natural philosophy at Harvard since 1905, and was formerly dean of the Lawrence Scientific School. Two years ago Prof. Sabine was Harvard exchange professor at the University of Paris. He was the author of a treatise on "Architectural Acoustics."

*Isis,* an international quarterly devoted to the history and philosophy of science, commenced publication in Belgium in 1913. A complete volume had appeared, together with two or three fascicules of the second volume, when the publication was brutally interrupted by the German invasion. M. Sarton, its editor, was hospitably received in the United States, where during the last four and a half years he has conducted a number of very successful courses of lectures on the history of science at several universities. We are glad to hear that he is about to visit Europe again in connection with the restarting of his journal, of which the materials for vols. ii. and iii. are almost ready. We understand that M. Sarton may be joined by Dr. Charles Singer, who has worked in England on somewhat similar lines, in subsequent periodical publications in connection with the history of science.

THE death is announced, in his seventy-ninth year, of Dr. Rossiter W. Raymond, one of the leading American authorities on mining. Dr. Raymond graduated at the Brooklyn Polytechnic Institute in 1858, and, after pursuing further studies at Munich, Heidelberg, and Freiberg, served with distinction in the American Civil War. In 1866 he became editor of the *American Journal of Mining,* afterwards the *Engineering and Mining Journal,* to which he remained a contributor up to the time of his death. From 1868 to 1876 he was U.S. Commissioner of Mining Statistics, and in that capacity acquired a great reputation for his investigations and reports. Dr. Raymond was one of the founders of the American Institute of Mining Engineers, of which he was president from 1872 to 1874 and secretary from 1884 to 1911. He was the author of "Mineral Resources of the U.S. in and West of the Rocky Mountains," a glossary of mining and metallurgical terms, and various other technical works and papers.

NEWS has been received, by telegram from Cape Town, that Dr. G. S. Corstorphine, principal of the South African School of Mines and Technology, Johannesburg, died on January 25. Dr. Corstorphine was appointed to the principalship of the college in 1913, and was recognised as one of the leading South African geologists and mineralogists, and a very eminent authority on questions connected with the geology of the Rand goldfield. Born in Edinburgh in 1868, Dr. Corstorphine was first trained for the teaching profession, and passed through the Moray House Training College course. He soon, however, developed a marked interest in science, and studied at Edinburgh University, principally in biology and geology, obtaining the Baxter science scholarship in 1892 for the most distinguished graduate for the year in those subjects. Thereafter he was appointed university assistant to Prof. James Geikie, and was, fortunately, able to devote a considerable part of each year to study abroad. Munich was in those days a favourite resort of Scottish students for post-graduate work, and under Prof. Groth and Prof. Weinschenk Dr. Corstorphine's interest in mineralogy, petrography, and geology was greatly stimulated. He took the degree of Ph.D. in 1895 with a thesis on some igneous rocks from the south of Arran, which was his only contribution to British geology. In 1896 he went to Cape Town as professor of geology in the South African College. He was also keeper of geology in the museum, and received appointment as director of the newly instituted Geological Survey of Cape Colony. In 1902, however, the attractions of the Rand drew him away from Cape Town, and he went to Johannesburg as consulting geologist to the Consolidated Goldfields Co. Later he set up in practice as a consulting geologist in Johannesburg, and his advice was much in request by mining companies. His best known work is "The Geology of South Africa," which he wrote jointly with Dr. F. H. Hatch. First published in 1905, the volume is now in its second edition. Dr. Corstorphine wrote several papers on problems of Transvaal geology, in some of which he had Dr. Hatch as collaborator. He was president of the South African Geological Society in 1906 and honorary secretary from 1910 to 1915.

AT a meeting of the Society of Antiquaries held on January 30, Capt. R. Campbell Thompson read a paper on the excavations which he had conducted by War Office orders on behalf of the British Museum at Abu Shahrain, in Mesopotamia. This place, the Eridu of the cuneiform records, lies in the desert about twenty miles south-west from Nasiriyah. It was partially excavated by J. E. Taylor in the middle of the last century, but the value of his discoveries was not at the time appreciated. The results of the recent excavations are of high scientific importance. Numerous chipped and ground celts and flakes show that the early inhabitants lived in the Stone age. More important even is the pottery of buff, wheel-turned clay, painted with geometric designs in black, exactly similar to that found in the lowest stratum at Susa by M. De Morgan. Though the people of Eridu were ignorant of writing, their culture was decidedly advanced. They lived on cereals and on fresh-water mussels from the Euphrates, which must then have flowed near the city. The relics represent the pre-Sumerian population which occupied southern Mesopotamia before the arrival of the Sumerian race.

DR. W. E. COLLINGE, 3 Queen's Terrace, St. Andrews, has issued a circular announcing the proposed foundation of an organisation and publication that will bring together students of wild birds. The objects of the Wild Bird Investigation Society are:—(1) The more intensive study of the ways and habits of British birds; (2) the protection of all beneficial and non-injurious wild birds and the repression of really injurious species; (3) the influencing and educating of public opinion as to the destructiveness or usefulness of wild birds to agriculture, horticulture, forestry, etc., by means of publications, meetings, lectures, etc.; (4) the discouragement of egg- and bird-collecting, except under guidance or for scientific purposes; (5) the improvement and modification of the existing laws relating to wild birds; (6) the establishment of bird sanctuaries under efficient control; (7) the discussion and consideration of these matters from all points of view; and (8) the establishment of local branches throughout the United Kingdom. At a later date it is proposed to call a general meeting for the purpose of approving the draft rules and to elect officers. Further particulars may be obtained from Dr. Collinge at the above address.

THERE seems reason to hope that prosperity is returning to the Zoological Society of London, which has come singularly well through a very anxious time. At any rate, at the monthly meeting of the society held on January 15 it was announced that there had been an increase in the gate-money received during 1918 of 544*l*., as compared with the total amount received during 1917. The most important additions to the menagerie during the month were a chimpanzee from Sierra Leone and thirty-two lizards, including eight starred lizards from Salonica, sent by Capt. W. D. Motton and Mr. G. H. Colt.

THE hawks of the Canadian prairie provinces in their relation to agriculture forms the subject of a valuable Bulletin (No. 28) by Mr. P. A. Taverner, issued by the Canadian Department of Mines. The author briefly, but lucidly, summarises the distinguishing features of the various species of hawks and falcons of these provinces, so that they may readily be identified by the farmer and sportsman, and, further, indicates the prey of each. One or two species he condemns on account of their ravages on game or poultry. But for the most part he urges protection, pointing out the immense services of these birds in keeping down the gophers, which, apart from the great quantities of grain they consume, have become a serious menace on account of the diseases they spread, not only among cattle, but also among the population of the rural districts. Text-figures and four most excellent coloured plates add greatly to the usefulness of this work.

The animal remains found in kitchen-midden deposits are relics of importance to both anthropologists and zoologists. Hence we are much indebted to Mr. Alexander Whetmore for his account of bird-bones found in kitchen-midden deposits in the islands of St. Thomas and St. Croix, published in the Proceedings of the United States National Museum (vol. liv.). Altogether thirteen species are represented in these deposits, of which one, a rail (*Nesotrochus debooyi*), is new to science. One or two species are now no longer found in a living state on St. Croix, and this is attributed to the fact that the early French settlers, somewhere about 1650, burned off the densely wooded covering of the whole island in order that they might render it more healthy, since up to that time fevers and other diseases had taken a heavy toll of the settlers. This conflagration, of course, entirely changed the character of the flora and fauna, and this fact has to be borne in mind by students of geographical distribution.

Under the title of "The Louse Danger," the British Museum (Natural History) has issued a third "poster" in the economic series. Attention is directed therein to the danger of the clothes (or body) louse as a carrier of relapsing fever, typhus, and trench fever. In order to avoid lice, regular washing of underclothing and bed-linen is advocated. It is further desirable to avoid contact with persons suspected of being verminous; hospital workers and others are advised to wear white linen overalls. For the purpose of getting rid of the lice, a hot bath, followed by a change of underclothing and immediate disinfestation of verminous garments, is an important measure. When eggs of the louse are present in the hair, close clipping or shaving is necessary; in the case of women, washing the hair with an insecticidal solution is advised, followed by thorough combing with a fine-toothed metal comb. Simple instructions for the disinfestation of clothing and bedding are appended, together with information concerning the most useful insecticides. The poster is written in a clear and easily understood style, and is well adapted for the purpose for which it is intended.

In the Kew Bulletin (No. 10, December, 1918) W. G. Craib gives a further instalment of his "Contributions to the Flora of Siam." Fourteen new species are described, belonging to ten families of flowering plants. They are mainly jungle plants collected by Kerr. The most interesting is a new genus of Gesneraceæ, Damrongia, allied to Didymocarpus, and named in honour of H.H. Prince Damrong, "who, himself interested in scientific pursuits, has done so much for the advancement of education in his country."

In the *Philippine Journal of Science* (vol. xiii., Section C, Botany, No. 5) E. D. Merrill continues his taxonomic work on the flora of the Philippines. Eighty-four new species, distributed among twenty-six families, are described, the principal additions being in the families Loranthaceæ, Myristicaceæ, Meliaceæ, Araliaceæ, Gesneraceæ (Cyrtandra), and Asclepiadaceæ. There is one new genus, Acanthophora (Araliaceæ), allied to Aralia, but recalling Acanthopanax in habit, It is a sparingly branched climber sprawling over thickets, with large compound leaves 3–5 ft. long, and an ample terminal inflorescence about 1 m. in length. Mr. Merrill has reason to believe that it occurs also in Celebes, and thus adds another to the already long list of forms common to the Philippines and Celebes. He adds:—"It is now thoroughly established that the Celebes and Moluccan floras are distinctly more closely allied to the flora of the Philippines than is that of any other region, indicating clearly that land connections undoubtedly existed in previous geologic times between the Philippines and the islands to the south and south-east." In addition to the new species, a few species previously known are for the first time credited to the archipelago, and a few changes in nomenclature are proposed.

In order to facilitate the use of quartz mercury-vapour lamps in dye-fading tests, the U.S. Bureau of Standards has recently measured the radiation of different wave-lengths emitted by a number of these lamps, and has determined its variation with the age of the lamp. The measurements were made by means of a thermo-pile and galvanometer, the various portions of the spectrum being separated by transmitting the radiation through absorbing glasses. The results show that the total radiation of a mercury-vapour lamp decreases during 1000 hours' intermittent use to 30–50 per cent. of its initial value, the radiation of wave-length less than $1{\cdot}4\mu$ decreases during that time from 30 per cent. of the total to about 20 per cent., while that of wave-lengths less than $0{\cdot}45\mu$ decreases from 20 per cent. of the total to about 14 per cent. Messrs. Coblentz, Long, and Kahler, the authors of the paper (No. 330 of the Bureau), attribute this falling off to the blackening of the inside of the quartz tube and the devitrification of the quartz itself.

A recent issue of the *Board of Trade Journal* (December 5) records some notable developments of chemical industries in the United States. One instance is the production of nitric acid on a large scale from atmospheric nitrogen. A Government cyanamide-nitrate plant, No. 2, began operations in October at Mussel Shoals, Alabama. The product was utilised for making high explosives, of which the output from this plant is said to be at the rate of about a quarter of a million pounds per annum. Another example is that of potassium compounds. A new unit of a potash plant on Searle's Lake, Southern California, was brought into operation early in November; its employment brings the production of potash by a single company working on this lake up to 140 tons a day.

In *Helvetica Chimica Acta*, No. 5, there is a short, but suggestive, paper by M. J. Lifschitz on chemical luminescence. Just as with the absorption of light, studies on the emission of light during chemical reactions may prove to be of notable significance in elucidating the connection between radiant and chemical energy and the nature of chemical action. The phenomenon of chemical luminescence is by no means confined to oxidation processes: a good display of light-emission is observed when hydrobenzamide is distilled in a current of hydrogen, although no oxygen is present. Similarly, other reactions indicate that the governing factor is not the total amount of transformed energy, nor the speed of the reaction. The author finds that the organo-magnesium compounds (*e.g.* Grignard's reagent) furnish very convenient material for the study of these and kindred phenomena.

FOR printing-out photographic processes, such as carbon printing, Mr. S. S. Richardson in the *British Journal of Photography* of January 24 recommends the new "Pointolite" lamp. This lamp needs so little current that special wiring is not necessary, and it will allow of, say, six negatives being printed from simultaneously, the exposure being about three-quarters of an hour with negatives of average density. Mr. Richardson also recommends the iron arc if a current of 5 or 6 amperes is available, using iron instead of the usual carbon poles. A lamp so arranged will run sometimes for hours without attention, as the iron burns away very slowly. At a distance of 50 centimetres the exposure required is about twenty minutes. With such "point" sources of light an ordinary glass negative may be printed "reversed" for the single transfer carbon process if ordinary care is taken to prevent troublesome reflections and movement of the negative during the exposure.

A PAPER on electric welding and three others on oxy-acetylene welding were read at the Institution of Mechanical Engineers on January 24. In his paper on electric welding Mr. Thomas T. Heaton says that in his opinion—based upon many years' experience—each known system of welding has its proper sphere, and that probably any given method may be the best in its respectively most suitable application. In the Benardos system of arc welding, direct current is employed at 90 volts and 250 to 500 amperes, according to the thickness of metal. The arc may be 1½ in. to 2 in. in length, and the heat may be spread over a fairly large surface, thus avoiding extreme local stresses. The work is positive to a carbon electrode. In the Kjellberg system a metallic electrode is used instead of carbon. The work is negative to the electrode, so that the natural tendency is to deposit the metal of the positive electrode on to the work. The electrode is coated with a fusible silica flux, which prevents oxidation and insulates the electrode. The arc dissipates this flux, leaving no slag. Generally, the electrodes are of 3/16 in. diameter soft iron wire. Mr. Heaton does not find this system to be satisfactory for plates thinner than 0·25 in. The quasi-arc process, invented by Mr. Arthur Strohmenger, of London, also employs metallic electrodes, and some excellent results are obtained by it. Various coatings may be applied to the electrodes, and may be of such a nature as to supply constituents that are burnt out of the metal in welding. Blue asbestos yarn is especially preferred as a coating in welding iron or mild steel, as it forms a reducing flux, and it may be smeared with a composition such as sodium silicate or aluminium silicate, etc., to vary the fusing temperature of the yarn. Descriptions of some useful testing machines for welds are included in Mr. Heaton's paper.

*Messrs. H. K. Lewis and Co., Ltd.*, have in the press two books by Sir J. W. Barrett, viz. "A Vision of the Possible: What the R.A.M.C. Might Become" and "The War Work of the Y.M.C.A. in Egypt," illustrated. The latter work will contain a preface by Gen. Sir E. H. H. Allenby. *The Library Press, Ltd.*, is bringing out "Practical Shell Forging and the Plastic Deformation of Steel and its Heat Treatment," by C. O. Bower, of Messrs. Armstrong, Whitworth, and Co., Ltd. One object of the work is to show the ways in which hydraulic plant can be profitably employed in peace-time production. *Messrs. J. M. Dent and Sons, Ltd.*, give notice of "New Town: A Proposal in Agricultural, Industrial, Educational, Civic, and Social Reconstruction," edited by W. H. Hughes.

A NEW weekly periodical is about to be published (at 8 Bouverie Street, E.C.4) entitled *Ways and Means: A Weekly Review of Industry, Trade, Commerce, and Social Progress.* Among the editorial features promised in the prospectus issued are Colonial development, expert opinion, industry and money, Government finance, education in relation to industry, industrial administration, reconstruction, art in industry, science and industry, organisation and system, and welfare.

## OUR ASTRONOMICAL COLUMN.

BORRELLY'S COMET.—This comet was under observation by Mr. R. L. Waterfield in Cheltenham during January. On January 9 it was a fairly easy object with 3-in., the magnitude being between 9·0 and 9·5; on January 26 it was still visible with 3-in., but much more difficult. The following is a short extension of the ephemeris (for Greenwich midnight):—

| | | R.A. | | | N. Decl. | | Log *r* | Log Δ |
|---|---|---|---|---|---|---|---|---|
| | | h. | m. | s. | ° | ′ | | |
| February | 6 | 6 | 31 | 57 | 66 | 14 | 0·2219 | 9·9607 |
| | 10 | 6 | 36 | 17 | 66 | 6 | 0·2281 | 9·9815 |
| | 14 | 6 | 41 | 48 | 65 | 52 | 0·2345 | 0·0014 |
| | 18 | 6 | 48 | 20 | 65 | 34 | 0·2410 | 0·0203 |
| | 22 | 6 | 55 | 39 | 65 | 11 | 0·2476 | 0·0381 |

REID'S COMET (1918*a*).—Circular No. 43 of the Union Observatory, Johannesburg, gives the following positions of this comet made by Mr. H. E. Wood, and the orbit which he deduced from them:—

| G.M.T. 1918 | | R.A. 1918·0 | | | S. Decl. 1918·0 | | |
|---|---|---|---|---|---|---|---|
| | | h. | m. | s. | ° | ′ | ″ |
| June | 13, 1968 | 9 | 15 | 36·52 | 9 | 5 | 55·3 |
| | 16, 1986 | 9 | 16 | 47·12 | 11 | 58 | 44·8 |
| | 19, 1982 | 9 | 17 | 4·48 | 14 | 40 | 51·5 |

$$T = 1918 \text{ June } 5{\cdot}275 \text{ G.M.T.}$$

$$\left.\begin{aligned} \omega &= 194^\circ\ \ 7'\ 18'' \\ \Omega &= 17^\circ\ 49'\ 28'' \\ i &= 70^\circ\ \ 8'\ 41'' \end{aligned}\right\} 1918{\cdot}0$$

$$\log q = 0{\cdot}04194$$

Middle place, obs.-comp. R.A. $-11''$, decl. $0''$. The orbit does not show a close resemblance to any in the catalogues. This was the only comet observed in 1918 that did not belong to the Jupiter family.

ASTRONOMY IN THE "TIMES."—We directed attention last week to the important new features in the meteorological reports in the *Times*, and have now pleasure in referring to another scientific innovation which appeared in the issue for February 1. A map is given, on the zenithal equidistant projection, of the stars and planets visible in London at 10 p.m. in mid-February, together with the path of the moon and our satellite's positions and phases at two-day intervals. There is accompanying letterpress by an astronomical correspondent, describing the leading points of interest in the constellations and directing attention to the approaching conjuncion (in 1921) of Jupiter and Saturn, which are now such conspicuous objects. If, as we understand, this is the first of a series of monthly maps and articles, they are likely to lead to a considerable awakening of interest in astronomy on the part of the general public.

THE ENERGY OF MAGNETIC STORMS.—Dr. S. Chapman contributes a paper on this subject to the Monthly Notices for November last. He considers that the sun is the source of energy, and that it is transmitted by streams of electric corpuscles. These ionise and charge the absorbing layer in the atmosphere. The accumulation of charge continues until the electrostatic repulsion overcomes gravity, when the electrified gas is impelled upwards, the atmosphere thus losing both its charge and part of its substance. It was formerly considered that to make the sun the source of energy would involve an inconceivable amount of output from the sun, but under the new theory this is not the case.